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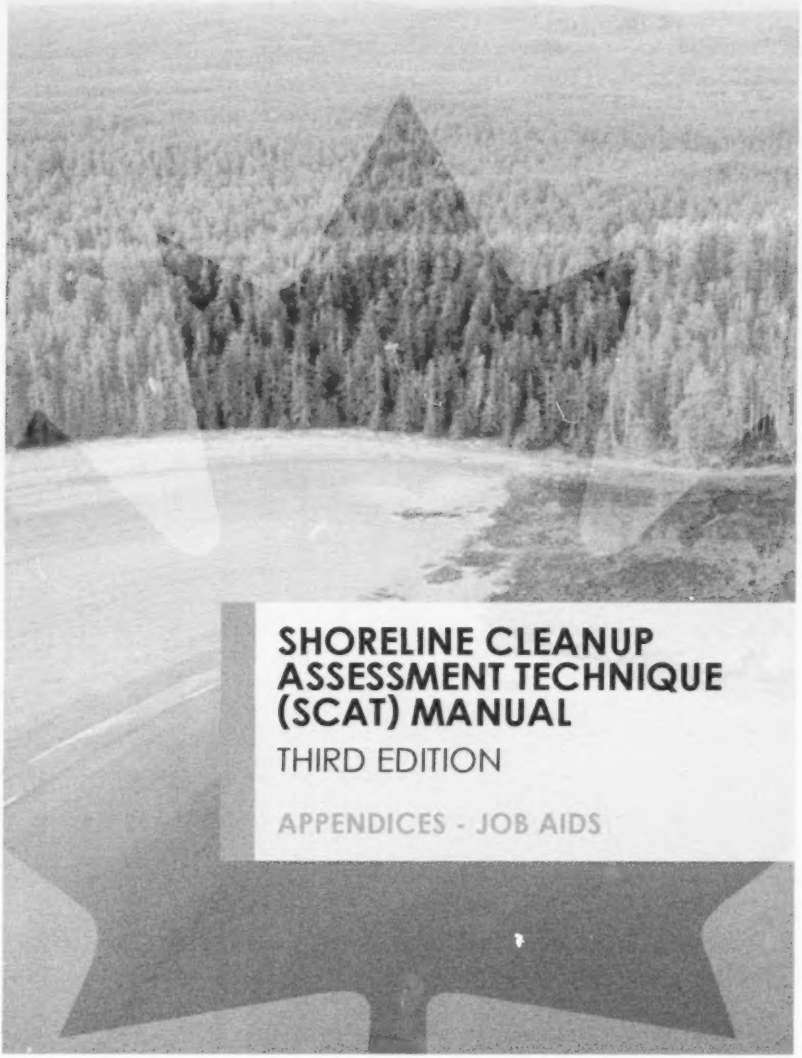

SHORELINE CLEANUP ASSESSMENT TECHNIQUE (SCAT) MANUAL

THIRD EDITION

APPENDICES - JOB AIDS

Canada

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Appendix 1 – Job Aids

This section is divided into two major Job Aid categories:

A. SCAT Field Job Aid

A Job Aid for SCAT field teams to aid in the observation and documentation of shoreline and oiling information

B. SCAT Management Job Aid

A Job Aid for the SCAT management team at the Command Post to aid SCAT management, planning and logistics

The Job Aids provide the following information and tools to aid a SCAT program in the field and at the Command Post:

A. SCAT Field Job Aid		
1 Shoreline Information	**2** Surface Oiling Information	**3** Subsurface Oiling Information
a Tidal Water Levels b Shoreline Zones c Wave Exposure d Sediment and Form e Shoreline Type f Coastal Character	a Length b Width c Percentage Distribution d Thickness e Character f Surface Oiling Matrices	a Depth b Thickness c Character d Subsurface Oiling Matrices
4 False Positives	**5** SOS Form Examples	

B. SCAT Management Job Aid

1 Endpoints, Shoreline Treatment Recommendations (STRs) and Shoreline/Segment Inspection Reports (SIRs)
2 SCAT Management Forms
3 SCAT Plan Outline
4 First Response and Equipment Checklists
5 Field Forms: (a) SOS, (b) Pre-SCAT

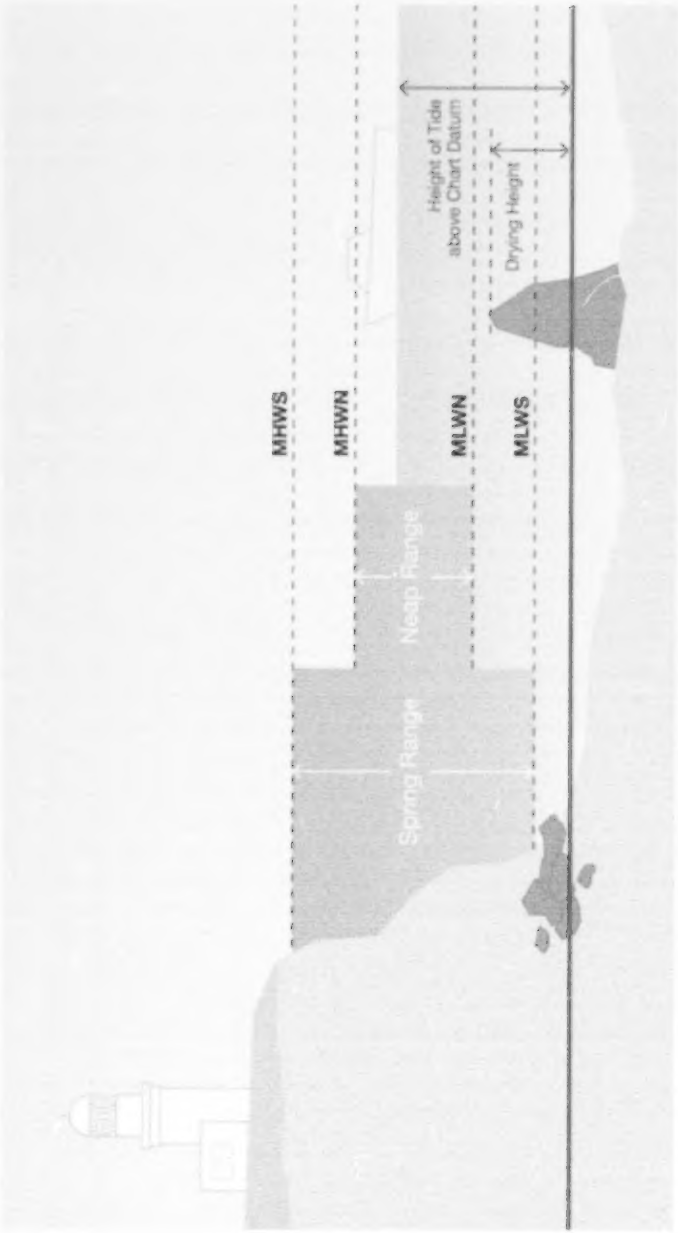
A | SCAT Field Job Aid

A.1 Shoreline Information

A.1a Tidal Water Levels

Water level at the time of oil deposition is a critical factor in oil persistence and remobilization. For tidal environments, water levels are described with respect to predicted or actual tidal elevations.

Tidal Water Levels		
HHW	Highest High Water	The long-term highest spring tide or storm surge water level
MHWS	Mean High Water Spring	The average high-water level at spring tides
MHW	Mean High Water	The long-term average high-water level (between the MHWS and the MHWN)
MHWN	Mean High Water Neap	The average high-water level at neap tides
MLWN	Mean Low Water Neap	The average low-water level at neap tides
MLW	Mean Low Water	The long- term average low-water level (between the MLWS and the MLWN)
MLWS	Mean Low Water Spring	The average low-water level at spring tides
LLW	Lowest Low Water	The long-term low spring tide
LHWS	Last High Water Swash	The upper limit of the swash run-up at the last high tide
-	Swash	The zone of wave action
-	Spring Tide	A tide just after a new or full moon, when there is the greatest difference between high and low water
-	Neap Tide	A tide just after the first or third quarters of the moon when there is the least difference between high and low water


MHWS
MHWN
MLWN
MLWS
Spring Range
Neap Range
Height of Tide above Chart Datum
Drying Height

A.1b Shoreline Zones

Tidal Shoreline Zones

Shoreline tidal zones refer to that part of the shoreline in terms of the exposure and inundation within the tidal cycle. The swash zone migrates within the intertidal zone during the tidal cycle. Tidal zones are based on the "high-high or mean high" and "lows" and not on the tide levels for a particular day, therefore the LITZ may not be visible every day.

Tidal Zones		
-	**Backshore**	The part of the beach that remains dry and is above the influence of normal waves and tides (not including exceptional events such as hurricanes and tsunamis)
-	**Backshore Fringe**	The intermediate area between the Supratidal zone and Backshore
SU	**Supra Shore Zone / Supratidal Zone**	The area above the mean high water (MHW) that occasionally experiences wave activity or that is occasionally inundated during high water levels, such as spring tides or wind-driven storm surges. Also known as the splash zone on bedrock or manmade solid shorelines
UP	**Upper Shore Zone**	The area typically with the greatest impact from stranded oil, both surface and subsurface (UITZ-MITZ) *
LW	**Lower Shore Zone**	This area is more important for considerations of biological resources, sensitivity and access (MITZ-LITZ) *
ITZ	**Intertidal Zone**	Between mean low water (MLW) and mean high water (MHW) and contains the swash zone in a tidal environment; also referred to as the "foreshore"
UITZ	**Upper Intertidal Zone**	The upper approximate one third of the intertidal zone*
MITZ	**Mid Intertidal Zone**	The middle approximate one third of the intertidal zone*
LITZ	**Lower Intertidal Zone**	The lower approximate one third of the intertidal zone*
STZ	**Subtidal Zone**	The area below the mean low water (MLW) that is always (or almost always) underwater
-	**Nearshore Zone**	Beyond the water line within the zone of breaking waves; also called the "surf zone" or the "breaker zone"
-	**Offshore**	Beyond (seaward) the nearshore zone of breaking waves

*The representation of the tidal zones (LITZ, MITZ, UITZ) on the shoreline is a factor of slope, and is therefore unlikely to be split into equal parts, with tidal zone divisions variable across-shore. With variations in slope, shoreline types, substrates and wave exposure, it is often difficult to determine the across-shore boundaries of different tidal zones on a shoreline during field evaluations and mapping projects. In order to provide a straightforward approach to documenting the shoreline during pre-SCAT and SCAT surveys, the inter-tidal zone is divided into two across-shore zones premised on the understanding and lessons learned from previous spill responses. The upper shore zone (MITZ-UITZ) is the area typically with the greatest impact from stranded oil, both surface and subsurface. The lower shore zone (MITZ-LITZ) is more important for considerations of biological resources, sensitivity and access. Although still indirectly based on the tidal zones, this makes the evaluation and coding of the across-shore features and locations more intuitive as descriptions are not directly tied to specific tidal zone breaks during mapping and field surveys, but more to morphology, biology and slope changes within the shore zone (Figures A1.1, A1.2).

Figure A1.1 *Example of variations in across-shore zone character, slope and width (upper shore zone beach with lower shore zone bedrock platform)*

Figure A1.2 *Example of across-shore zonation (supra-upper-lower)*

Non-Tidal Shoreline Zones

In non-tidal environments, the shoreline zones are defined in relation to seasonal or annual water levels and swash zones.

Non-Tidal Shoreline Zones		
SSZ	**Supra-Swash Zone**	The area above the highest annual water level that occasionally experiences wave activity during a storm event
USZ	**Upper Swash Zone**	The area between the highest annual water level and the mean annual water level; the upper approximate one half of the zone of wave activity
LSZ	**Lower Swash Zone**	The area between the mean annual water level and the lowest annual water level; the lower approximate one half of the zone of wave activity

A.1c Wave Exposure

The exposure of a shoreline segment to wave energy conditions influences sediment grain size, remobilization potential, oil burial or re-exposure, natural recovery and oil-sediment interactions.

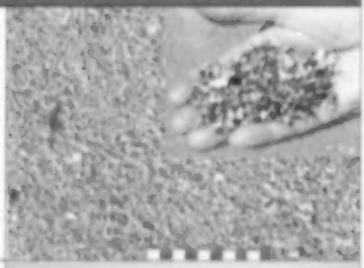
Wave Exposure	
Exposed	Maximum wave fetch distances greater than 500 km. High energy ambient wave conditions usually prevail in this exposure category, which is typical of open ocean-wave environments
Semi-Exposed	Maximum wave fetch distances between 50 and 500 km. Swells generated in areas distant from the coast create relatively high energy wave conditions. Extremely large waves may occur during storms
Semi-protected	Maximum wave fetch distances in the range of 10 to 50 km. Wave heights and wave energy levels are low most of the time, except during high winds
Protected	Maximum wave fetch distances of less than 10 km; usually areas of provisional anchorages and with low wave exposure except during extreme winds
Very Protected	Maximum wave fetch distances of less than 1 km; low wave-energy environment, often the location of all-weather anchorages, marinas or harbours

A.1d Shoreline Classification: Sediment Grain Size and Shoreline Form

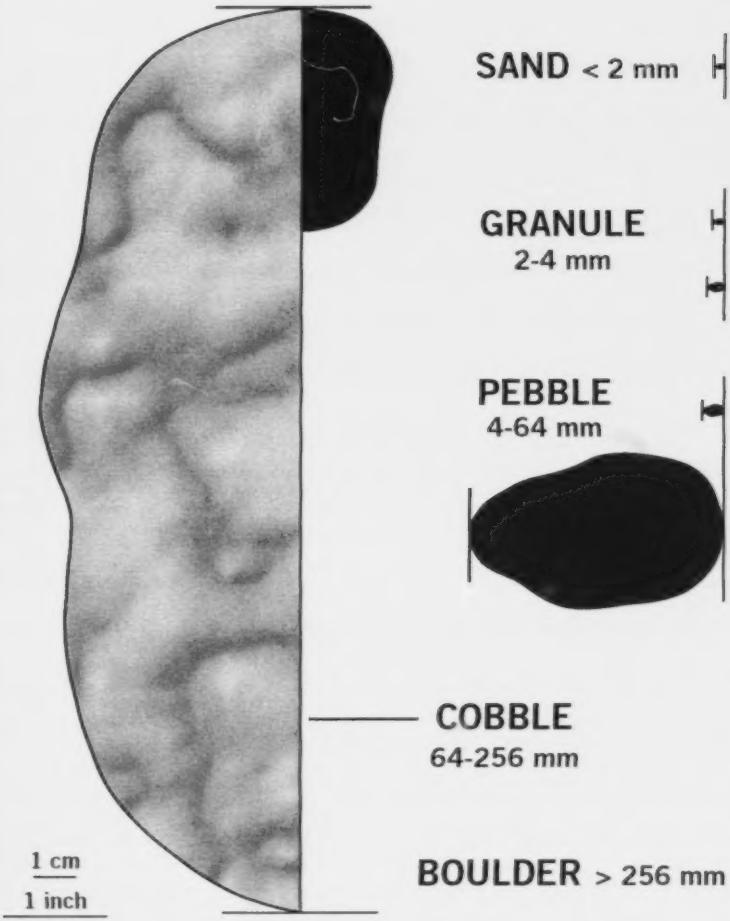
The "Shoreline Types" (Section 1e) defined in Environment and Climate Change Canada's (ECCC's) marine shoreline classification system and that are used in SCAT are based on a combination of the substrate materials and the morphology (form) in the upper intertidal zone. Where sediments are present, the substrate classification is based on the grain size (diameter) of the sediment. The following photographs provide examples of the shoreline sediment classes.

Sediment Grain Size

Description (Wentworth Scale)	Grain Diameter (mm)	Example Photographs
Boulder	>256 (larger than a soccer ball)	
Cobble	64–256 (between tennis ball and soccer ball in size)	
Pebble	4–64 (between a pea and a tennis ball in size) (coin for scale)	

Description (Wentworth Scale)		Grain Diameter (mm)	Example Photographs
Granule		2–4	
Sand	Very Coarse	1–2	
	Coarse	0.5–1.0	
	Medium	0.25–0.5	
	Fine	0.125–0.25	
	Very Fine	0.0625–0.125	
Silt		0.004–0.0625	
Clay		0.00024–0.004	

Sediment Grain Size Chart (not to scale)



Shoreline Form

Description	Definition
Beach	Steep or shallow sloping surface composed of unconsolidated sediments. Sediment "beaches" include slopes from 5° to 35°, although most are <20°
Flat	Level or low angled (< than 5°) sloping surface dominated by fine sediments: (sand, silt and clay)
Cliff	Sloped faces >35° consisting of either consolidated bedrock or unconsolidated materials
Bedrock Ramp	Bedrock shoreline with inclined slopes ranging from >5° to <35°
Bedrock Platform	Almost horizontal bedrock shoreline with an overall slope of <5°
Terrace	Step-like bedrock ramp or platform

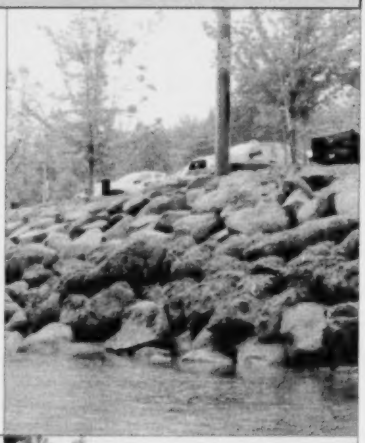
A.1e Shoreline Type

Oil most typically strands on the upper intertidal zone and, during periods of spring or wind-driven tides, on the supra-tidal zone. The "Shoreline Type" describes the character of these zones, which are the primary focus for SCAT surveys and pre-SCAT mapping.

The primary "Shoreline Type" used by SCAT in Canada refers to the clearly predominant shoreline character located in the upper intertidal zone, where oil typically is deposited and where treatment or cleanup activities take place. In some cases, there is more than one shoreline type observed within a shoreline segment. The less prevalent varieties are described as "secondary shoreline types." Secondary shoreline types can be associated with any of the intertidal zones (not just the upper intertidal zone) and there may be more than one "secondary" type. The major distinction between the shoreline types is that between impermeable and permeable substrates, as this property fundamentally controls the behaviour and persistence of oil on a shoreline as well the types of treatment options that might be appropriate.

- The second distinction within permeable shoreline types relates to the presence of vegetation.
- Examples of the 17 Shoreline Types are provided in the photographs on the following pages. Further detailed information on different shoreline types, including oil behaviour, sensitivity, and recommended treatment options, is provided in Environment and Climate Change Canada (2016).

Shoreline Type	Description	Example Photographs
Impermeable Shorelines		
Bedrock	Impermeable native rock, including cliffs, stacks, ramps, terraces, platforms and reefs	
Ice	Ice that occurs where glaciers or ice shelves reach the coast, permafrost is exposed or solid seasonal ice forms as a layer on the shore (the range of ice shoreline types for SCAT is listed at the end of this section)	
Manmade Impermeable	Manmade (anthropogenic) structures that are composed of impermeable materials in a form that oil penetration is not an issue	

Shoreline Type	Description	Example Photographs
Permeable shorelines		
Manmade Permeable	Manmade (anthropogenic) features and structures that are composed of permeable material(s), either of natural or manmade origin (e.g. concrete). Manmade permeable shorelines may be considered the equivalent of similar sized natural sediments, e.g. rip-rap = manmade boulder	
Sand Beach	Beach composed of sand. May include small amounts (< 10%) of granules, silts and clays	
Mixed Sediment (Sand-Pebble-Cobble) Beach*	Sand mixed with any combination of coarse sediments, such as granules, pebbles and cobbles (*see p. 17)	

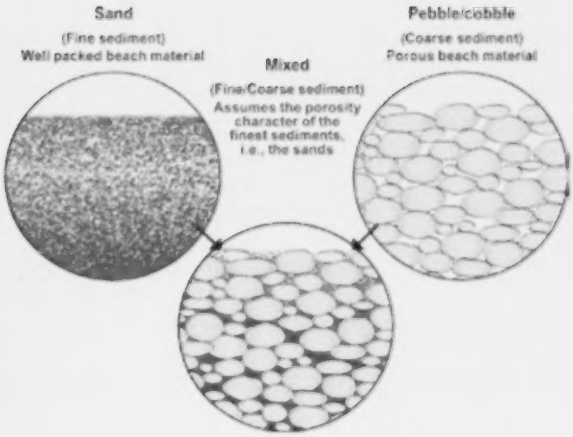
Shoreline Type	Description	Example Photographs
Pebble-Cobble Beach	A beach dominated by either pebbles or cobbles, or a combination of both, typically with <10% sand	
Boulder Beach	A beach dominated by the presence of boulders; may overlay fine materials or bedrock	
Mud Flat	Wide, low-angle intertidal zone consisting of mud, silt and/or clay	
Sand Flat	Wide, low-angle intertidal zone consisting of sand; may include granules, silts and clays	

Shoreline Type	Description	Example Photographs
Mixed Sediment Flat*	Wide, low-angle intertidal zone consisting of sand plus >10% of any or all of the coarser sediments, granules, pebbles, cobbles or boulders	
Snow-covered shoreline	Any shoreline type with seasonal snow that is deposited on top of the substrate	
Vegetated Shorelines		
Wetlands/ Marsh	Vegetated shoreline that is covered at least once a month by salt or brackish water at spring high tides or during wind-driven surges	
Peat Shoreline	Dominated by peat, a spongy, compressible, fibrous material that forms from the incomplete decomposition of plant materials	

Shoreline Type	Description	Example Photographs
Tundra Cliff (Ice Rich)	Erosional feature composed of a tundra (vegetation) mat that usually overlies peat and has exposed ground ice (permafrost)	
Tundra Cliff (Ice Poor)	Eroding, unconsolidated cliffs with a surface tundra mat	
Inundated Low-Lying Tundra Shoreline	Low-lying coastal tundra that is flooded or inundated by marine or brackish waters during spring high tides or wind-driven surges	

* **A mixed sediment beach or mixed sediment flat** has, by definition, a combination of sand plus >10% component of any or all of the larger size sediments, granules, pebbles, cobbles or boulders. The primary defining feature is that the interstitial spaces (voids) between the coarse (pebble/cobble) fractions are in-filled with sand or granules. This important characteristic controls oil penetration. Mixed sediment beaches are subdivided based on differences in the coarse fractions, which affect oil penetration and the selection of appropriate treatment tactics. The subtypes are described below:

- fine-mixed (sand/granule/pebble); and
- coarse-mixed, which includes larger cobble and boulder materials.



Snow and Ice Conditions

Nearshore and shore-zone snow and ice conditions have their own specific SCAT terms, definitions and abbreviations, as listed below. Photographic examples of these shoreline conditions are provided in the EPPR Arctic SCAT Manual (Owens and Sergy, 2004), and by Øksenvåg et al. (2009) and Owens et al. (2005). A detailed discussion of coastal processes and shoreline types in ice- and snow-affected coastal regions is presented and illustrated in Chapter III-3, and Arctic SCAT surveys are discussed in Chapter VI-1 of the EPPR Arctic Response Guide (2015).

Abbreviation	Description
SNW	Snow
FSW	Frozen Swash
FSP	Frozen Spray
IFT	Ice Foot
IPR	Ice-Push Ridge
GFL	Grounded Ice Floes
GLC	Glacier Ice
FWI	Fresh Water Ice

A.1f Coastal Character

Operational activities, such as access, staging, decontamination and waste storage, typically take place in the supra tidal or inland backshore area (above the HHW) which is described by the "Coastal Character". A description of the coastal character (e.g. cliffs, dunes, public road etc.) is necessary for planning, logistics, access and safety of shoreline treatment operations.

The primary coastal character used in SCAT corresponds to the one that is clearly predominant within the shoreline segment. If more than one type of coastal character is observed within a shoreline segment, then the less predominant secondary coastal character is also recorded, since these could also affect treatment operations, selection of treatment method and access to the site.

Coastal Character Descriptors
Forested
Vegetated
Bare
Bedrock
Boulder
Cobble
Pebble
Granule
Sand
Mud/Silt/Clay
Organic/Peat/Soil
Manmade Solid
Manmade Permeable

Coastal Character Classification
Cliff/Hill
Sloped
Flat/Lowland
Beach
Delta
Dune
Lagoon
River/Inlet/Channel
Wetland
Manmade

A.2 Surface Oiling Information

General Location of Oil

The following definitions and graphic describe the location of the oil in the shore zone. SCAT surveys focus primarily on surface and subsurface oil that has stranded at the shoreline. Sunken oil is dealt with in Section 6.4.6.

Oil Locations and Shoreline Area Definitions	
Surface oil	Oil on the surface of the shoreline substrate
Subsurface oil	Oil in a beach that has penetrated the sediments or been buried by sediment movement due to wave or wind action (a more detailed definition is provided in A.3a)
Floating oil	Oil floating at or near the water's surface
Submerged oil	Oil within the water column of near neutral buoyancy; may also be temporarily submerged due to entrainment by water turbulence so that the oil floats to the surface in calmer conditions
Sunken oil	Oil deposited on the sea/lake floor bottom, typically negatively buoyant

Describing Surface Oil Conditions
Different combinations of measurements and/or observations may be used to provide a general description of surface oil conditions recorded as oiled zones.

Description	Provides...
Length	An along-shore measurement of the presence or absence of oil
Width	A cross-shore measurement of oil band width
Length x Width	A measure of the total oiled area
Length x Width x Distribution	An estimate of oil cover or "oil distribution"
Length x Width x Distribution x Thickness	An estimate of the amount (volume) of oil

A.2a Length

Length is the alongshore distance of a shoreline parallel to the water line within a segment, sub-segment or zone. The "oiled length" is the alongshore dimension of an oiled zone within a segment or sub-segment. Length is measured by:

- Distance between GPS waypoints
- Actual measurement (e.g. using tape measure or range finder)
- Visual or paced estimation

A.2b **Oil Width**

Oil width is the average across-shore (perpendicular to the water line) dimension of the oil band within an oil zone. If multiple across-shore bands are grouped, then width represents the sum of their widths. The width category should be standardized for each incident based on the local tidal range as this property has implications for oiling matrices (A.2f). As an example, oiled band width can be categorized into the following groups:

Width Group	Width of Oiled Band	
	Small Tidal Range (<2 m) and Lakes	**Large Tide Range (>2 m)**
Wide	>2 m	>6 m
Medium	1–2 m	3–6 m
Narrow	0.3–1 m	0.5–3 m
Very Narrow	<0.3 m	<0.5 m

This can be further adapted to local environmental conditions.

- For heavy (Continuous or Broken – see A.2c) oiling, the reported oil band width is the average width of the oiled zone(s).
- For lighter (Patchy or Sporadic – see A.2c) oiling, the reported oiled zone must be operationally practical. For example, on a segment with many small patches of oil or tar balls/patties, the oiled zone should cover the whole area within which the oiling is found, rather than break the patches/tar balls/patties up into individual zones. For ease of location, if there is a low possibility of transportation/remobilization of the oil by wave action, the waypoints of individual patches may be reported on the SOS form. However, if there are only a few small patches of oil, then these could be sub-segmented so that No Observed Oil (NOO) is documented elsewhere.

A.2c **Surface Oil Distribution**

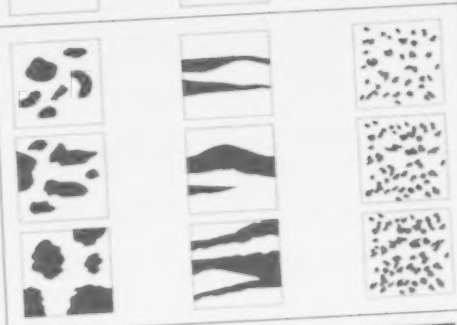
Surface Oil Distribution mapping requires a visual estimation of the percentage distribution of oil within a fixed area (zone), e.g. the oiled area, or oiled band. For values >1%, the actual percentage distribution value should be recorded; for values <1%, the number and size of oiled features (e.g. tar balls) per unit area should be recorded.

Decisions on how to define and map oiled zones can be challenging and are often based on the choice whether to "lump" or "split" the observed oil deposits. For higher distribution values, these decisions are fairly straightforward. However, mapping can be more difficult for lower distribution values, particularly when distributions fall below 1%. For example, if two isolated tar balls are observed along a uniform 300 m segment, this distribution could be lumped as two small oiling observations in a single zone, which would result in the entire length of shoreline being documented in tables and on maps as 300 m of Very Light or Trace oiling. Conversely, the same observations could be recorded as five separate alongshore zones, i.e.:

(a) 100 m of NOO
(b) 1 m of Very Light or Trace
(c) 98 m of NOO
(d) 1 m of Very Light or Trace and
(e) 100 m of NOO

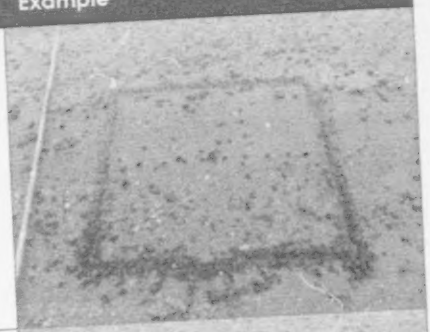
This detailed mapping would generate 2 m of Very Light or Trace oiling and 298 m of NOO oiled shoreline in tables and on maps. The first method is simpler, easier, and requires much less effort and data recording; however, this "lumping" process grossly overrepresents the actual oiling conditions. Although in most cases, neither oiling condition likely would result in the requirement for treatment, the effects on the metrics are very real and can be significant when applied over a large affected length of shoreline.

The following visual aid can assist with gross level estimation and may be useful for areas of heavy oil cover or very low altitude aerial observations. A distribution of <1% defines trace oil distribution.

Category	Percentage Distribution	Schematic Examples
Sporadic	1–10%	
Patchy	11–50%	
Broken	51–90%	
Continuous	91–100%	

Tools for Estimating Low Distributions of Oil

An accurate estimation method is to, visually or physically, draws a 1 m^2 box around a representative area or areas of oiled shoreline, mentally or physically push the oil together toward one edge and estimate how much area this oiled aggregate occupies. This technique is particularly suited to estimating low distributions of oil, such as sporadic oiling or tar balls.

Methodology	Example
Visually or physically draw a 1 m^2 box around an area of tar balls which represents the average for the segment/zone. Note: this exercise can be repeated several times in the oil zone to increase the confidence level regarding "average" oiling.	
Visually or physically divide the box into smaller sections. Note in this case the 5% section would be ~10 cm x 50 cm. A 1% distribution would fill a box 1 cm x 1 m or 2 cm x 50 cm, or 10 cm x 10 cm.	
Visually or physically move the oil/oiled sediment together into a smaller section to estimate the percentage distribution of oil within that representative box.	

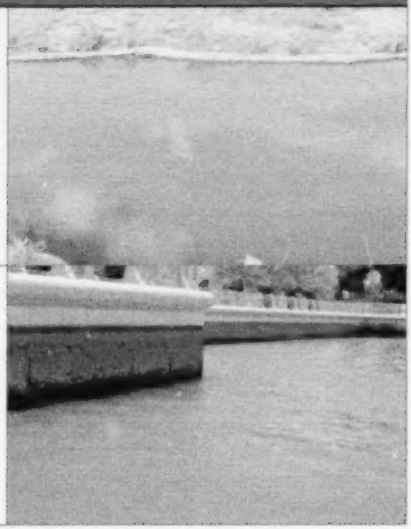
A.2d Surface Oil Thickness

Surface Oil Thickness is the average or dominant oil thickness within the segment or zone, based on the following categories:

Category		Thickness	Description
TO	Thick Oil	>1 cm	Typically consists of fresh oil or mousse accumulations, or asphalt pavements
CV	Cover	>0.1–1 cm	-
CT	Coat	>0.01–0.1 cm	Can be scratched off easily with fingernail on coarse sediments or bedrock
ST	Stain	≤0.01 cm	Cannot be scratched off easily with fingernail on coarse sediments or bedrock
FL	Film	-	Transparent or translucent film or sheen

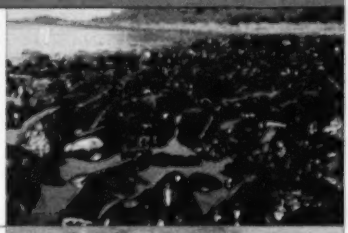
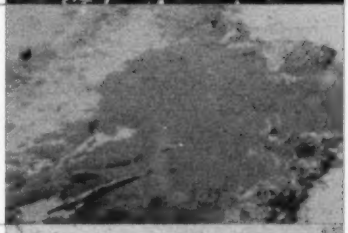
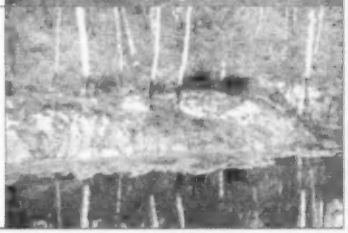
For oil on water, the Bonn Convention for the thickness of oil on water is applied:

Appearance		Thickness	Example Photograph
Br	Continuous True Colour (black/brown or emulsion)	>200 µm	
	Discontinuous True Colour	50–200 µm	
Mt	Metallic Sheen	5.0–50 µm	
Rb	Rainbow	0.3–5.0 µm	

Appearance		Thickness	Example Photograph
Sv	Silver	0.04–0.30 µm	
Nn	None	-	

A.2e Surface Oil Character

Standard terms are used to describe the character of surface oil on shorelines. The primary terms for oil character are shown below.

Oil Character		Description	Example Photographs
FR	Fresh	Typically unweathered, low-viscosity oil	
MS	Mousse	Emulsified oil (oil and water mixture) existing as patches or accumulations, or within interstitial spaces	
TB	Tar balls	Discrete oil balls on a beach or adhered to bedrock or coarse-sediment substrate. Tar ball diameters are defined as <10 cm	
PT	Tar Patties	Discrete patties of oil on a beach or adhered to the substrate. Tar patties are defined as >10 cm	
TC	Tar Coat	Weathered coat or cover of tarry, almost solid consistency	

Oil Character		Description	Example Photographs
SR	Surface oil Residue	Consists of non-cohesive, oiled surface sediments, either as continuous patches or in coarse-sediment interstices	
AP	Asphalt Pavement	Consists of a cohesive mixture of oil and sediments	
DB	Oiled Debris	Can consist of logs, rubbish and flotsam stranded on the shoreline; dead animals or vegetation; and spill response items such as sorbents, booms and snares	
NOO	No Observed Oil	-	

Secondary oil character descriptors can include the following:

- "Sticky/tacky" to the touch, this frequently is an important wildlife consideration;
- "Relatively free/mobile";
- "Fixed/retained/adhering" to the sediment;
- Highly weathered, or viscous; and
- Heavier than water, i.e. is there a potential source for sunken oil.

A.2f Surface Oiling Matrices

Oiling matrices are used within the SCAT database to categorize the oiling in a segment into "Heavy", "Moderate", "Light", "Very Light" or "Trace". This categorization provides an overview of the oiling in an area; can be visually displayed using maps, charts and tables; and helps to prioritize shoreline operations. Typically, the categorization displays (maps, pie charts and tables) receive high exposure and importance, so it is essential that they be adjusted to oil conditions / tidal width at the beginning of the response to accurately represent the range of oil distribution (low to high).

- For oiled shorelines:
  - A segment is initially categorized using the width of the oiled band and the oil distribution. (**Shoreline Initial Surface Oil Matrix**) (Table A1.1)
  - The initial classification is then combined with the average thickness of oil in that segment (**Shoreline Surface Oil Categorization Matrix**) (Table A1.2) to provide the Surface Oil Categorization
- For vegetated shorelines, where marsh vegetation has been oiled:
  - A segment is initially categorized using the width of the oiled band and the percentage destitution of the individual number of plants that have been oiled. (**Vegetated Shoreline Initial Oil Matrix**) (Table A1.3)
  - The initial classification is then combined with the average percentage of the length of the stem that has been oiled (**Shoreline Surface Oil Categorization Matrix**) (Table A1.4) to provide the Vegetated Shoreline Oil Categorization
- For submerged wetland or standing water:
  - A segment is initially categorized using the size of the oiled area and the oil distribution. (**Wetland or Standing Water Initial Surface Oil Matrix**) (Table A1.5)
  - The initial classification is then combined with the average thickness of oil in that segment or polygon (**Wetland or Standing Water Surface Oil Categorization Matrix**) (Table A1.6) to provide the Wetland or Standing Water Surface Oil Categorization

NOTE: the following matrices are provided as examples, and may be changed according to the oiling conditions for a specific incident. For low levels of oiling, Trace categories may be added to the matrices. (Tables A1.7 and A1.8)

Table A1.1 *Example of a Shoreline Initial Surface Oil Matrix*

		Width of Oiled Band			
Small Tidal Range (< 2 m) or Lake		>2 m	1–2 m	0.3–1 m	<0.3 m
Large Tidal Range (>2 m)		>6 m	3–6 m	0.5–3 m	<0.5 m
Oil Distribution	**Continuous 91–100%**	Heavy	Heavy	Moderate	Light
	Broken 51–90%	Heavy	Heavy	Moderate	Light
	Patchy 11–50%	Moderate	Moderate	Light	Very Light
	Sporadic 1–10%	Light	Light	Very Light	Very Light
	Trace <1%	Very Light	Very Light	Very Light	Very Light

Table A1.2 *Example of a Shoreline Surface Oil Categorization Matrix*

		Initial Surface Oil Category			
		Heavy	**Moderate**	**Light**	**Very Light**
Average Thickness	**Thick >1 cm**	Heavy	Heavy	Moderate	Light
	Cover ≤1.0–>0.1 cm	Heavy	Heavy	Moderate	Light
	Coat ≤0.1–>0.01 cm	Moderate	Moderate	Light	Very Light
	Stain/Film ≤0.01 cm	Light	Light	Very Light	Very Light

Table A1.3 *Example of a Vegetated Shoreline Initial Oil Index*

		Width of Oiled Band			
Small Tidal Range (< 2 m) or Lake		>2 m	1–2 m	0.3–1 m	<0.3 m
Large Tidal Range (>2 m)		>6 m	3–6 m	0.5–3 m	<0.5 m
% Distribution of Plants Oiled	**Continuous 91–100%**	Heavy	Heavy	Moderate	Light
	Broken 51–90%	Heavy	Heavy	Moderate	Light
	Patchy 11–50%	Moderate	Moderate	Light	Very Light
	Sporadic 1–10%	Light	Light	Very Light	Very Light
	Trace <1%	Very Light	Very Light	Very Light	Very Light

Table A1.4 *Example of a Vegetated Shoreline Oil Categorization Matrix*

		Initial Vegetated Oil Category			
		Heavy	**Moderate**	**Light**	**Very Light**
% of Length of Stem Oiled	**91–100%**	Heavy	Heavy	Moderate	Light
	51–90%	Heavy	Heavy	Moderate	Light
	11–50%	Moderate	Moderate	Moderate	Light
	1–10%	Light	Light	Light	Very Light
	<1%	Very Light	Very Light	Very Light	Trace

Table A1.5 *Example of a Wetland or Standing Water Initial Surface Oil Matrix*

		Oiled Area			
		>1000 m²	100–1000 m²	10–100 m²	<10 m²
Oil Distribution	Continuous 91–100%	Heavy	Heavy	Moderate	Light
	Broken 51–90%	Heavy	Heavy	Moderate	Light
	Patchy 11–50%	Moderate	Moderate	Light	Very Light
	Sporadic 1–10%	Light	Light	Very Light	Very Light
	Trace <1%	Very Light	Very Light	Very Light	Very Light

Table A1.6 *Example of a Wetland or Standing Water Surface Oil Categorization Matrix*

		Initial Surface Oil Category			
		Heavy	Moderate	Light	Very Light
Appearance or Thickness	Thick >1 cm	Heavy	Heavy	Moderate	Light
	Cover ≤1.0–>0.1 cm	Heavy	Heavy	Moderate	Light
	Continuous True Colour	Moderate	Moderate	Light	Very Light
	Discontinuous True Colour	Moderate	Moderate	Light	Very Light
	Metallic Sheen	Light	Light	Light	Very Light
	Rainbow Sheen	Light	Light	Very Light	Very Light
	Silver Sheen	Very Light	Very Light	Very Light	Very Light

Table A1.7 *Example of a Shoreline Initial Surface Oil Matrix Adjusted for Decreasing Distribution Values (<1% Trace)*

		Oiled Area			
		>1000 m²	100–1000 m²	10–100 m²	<10 m²
Oil Distribution	Continuous 91–100%	Heavy	Heavy	Moderate	Light
	Broken 51–90%	Heavy	Heavy	Moderate	Light
	Patchy 11–50%	Moderate	Moderate	Light	Very Light
	Sporadic 1–10%	Light	Light	Very Light	Very Light
	Trace <1%	Trace	Trace	Trace	Trace

Table A1.8 *Example of a Shoreline Surface Oil Categorization Matrix Adjusted for Decreasing Distribution Values (<1% Trace)*

		Initial Surface Oil Category				
		Heavy	Moderate	Light	Very Light	Trace
Average Thickness	Thick >1 cm	Heavy	Heavy	Moderate	Light	Very Light
	Cover ≤1.0–>0.1 cm	Heavy	Heavy	Moderate	Light	Very Light
	Coat ≤0.1–>0.01 cm	Moderate	Moderate	Light	Very Light	Trace
	Stain/Film ≤0.01 cm	Light	Light	Very Light	Very Light	Trace

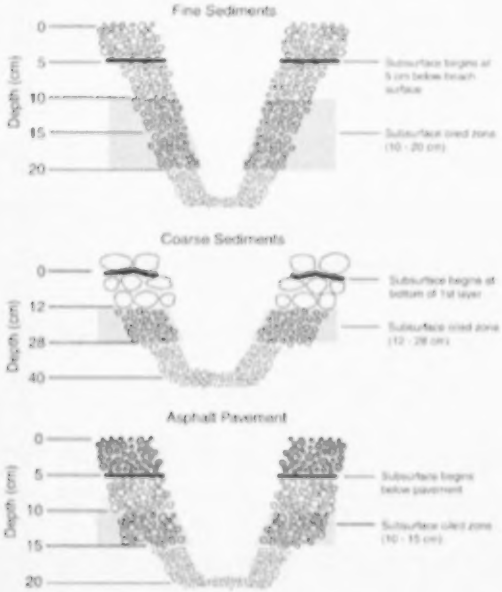
A.3 Subsurface Oil

A.3a Depth

In order to standardize the definitions of surface versus subsurface, the following terms have been generally accepted:

- **Fine Sediment (Pebbles, Granules, Sand, Mud)**: Subsurface begins at 5 cm below the surface. If a pit were to reveal oiling in sand from the surface down to 20 cm, the upper 5 cm would be classified as surface oil and the remainder as subsurface. However, the oiled interval still would be shown as 0 to 20 cm. In the example below, the oiled interval is 10–15 cm of subsurface oil.
- **Coarse sediment (Boulders, Cobbles)**: Subsurface begins at the bottom of the surface material (i.e. where the top layer of cobbles or boulders contact the underlying layer of sediments).
- **Asphalt Pavement**: Where AP exists on the surface, the subsurface begins at the underside of the pavement.

A visual explanation of these definitions is depicted below.



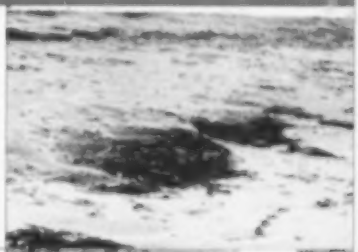
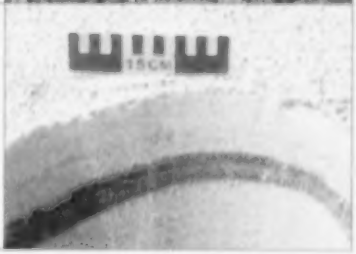
Depth should be measured using a ruler.

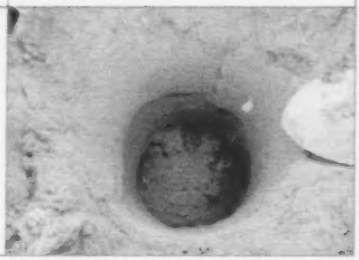
A.3b **Thickness**

The thickness of the oiled layer may be estimated visually, or measured using a ruler.

A.3c **Subsurface Oil Character**

Standard terms are used to describe the character of subsurface oil on shorelines.

Oil Character		Description	Example Photographs
AP	Asphalt Pavement	Cohesive mixture of weathered oil and sediment situated completely below a surface sediment layer(s); photograph shows partially exposed subsurface asphalt	
OP	Oil-Filled Pores	Pore spaces in the sediment matrix are completely filled with oil; often characterized by oil flowing out of the sediment when disturbed	
PP	Partially-Filled Pores	Pore spaces are filled with oil, but it generally does not flow out when exposed or disturbed	

Oil Character		Description	Example Photographs
OR	Oil Residue	Cover (0.1–1 cm) or coat (0.01–0.1 cm) of oil residue on sediment and/or some pore spaces partially filled with oil	
OF	Oil Film or Stain	<0.01 cm stain or film oil residue on the sediment surfaces. Non-cohesive. Often determined by sheen type (see A2.d)	
TR	Trace	Discontinuous film or spot of oil on sediment, or an odour or tackiness with no visible evidence of oil	Difficult to see in a photograph
NO	No Oil	No visible or apparent evidence of oil	

A.3d Subsurface Oil Categorization Matrix

A single matrix is used within the SCAT database to categorize the subsurface oiling in a segment into "Heavy", "Moderate", "Light" or "Very Light". This categorization provides an overview of the subsurface oiling in an area, can be visually displayed using maps, charts and tables, and helps to prioritize shoreline operations.

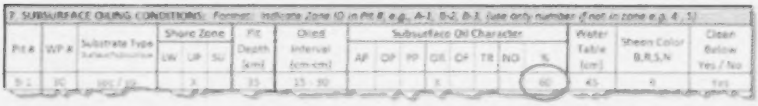
- For subsurface oiling:
  - Subsurface oiling is categorized using the depth of penetration or thickness of the oil layer, and the relative oil concentration, based on the categorization of the oil (**Subsurface Oil Categorization Matrix**) (Table A1.9)

NOTE: the following matrix is provided as an example, and may be changed according to the oiling conditions for a specific incident. In some situations, for example where buried oil is patchy or sporadic, it may be appropriate to consider percentage distribution in the categorization of the subsurface oiling.

Table A1.9 *Subsurface Oil Categorization Matrix*

		Depth of Penetration or Thickness of Oil Lens			
		>30 cm	21–30 cm	11–20 cm	0–10 cm
Relative Oil Concentration	OP/AP	Heavy	Heavy	Moderate	Moderate
	PP	Heavy	Moderate	Moderate	Light
	OR	Moderate	Moderate	Light	Light
	OF/TR	Light	Very Light	Very Light	Very Light

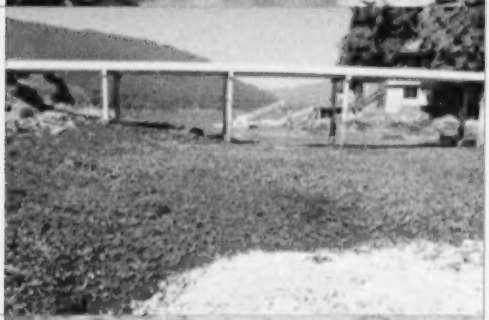
The final representation of subsurface oiling can be further modified by using the percent (%) distribution value on SCAT SOS forms. For example, during the Deepwater Horizon response, much of the subsurface oiling was individual buried tar and residue balls, so the reported subsurface oiling was reduced by one oiling category where the distribution within the oiled interval was less then 10%, e.g. Moderate -> Light.



A.4 False Positives

SCAT observers should be aware of "false positives" that may appear to be oil, particularly from an aerial platform or from a distance, but either are a completely different material, or oil from a non-petrogenic source. Examples include floating vegetation/algae/coral, organic sheen, black mineral sands, peat and other dark organic materials such as mussels or lichen. Examples of false positives seen on land and water are provided below.

False Positive Example	Example Photographs
Cloud shadows	
Floating vegetation (seaweed)	
Seagrass beds	

False Positive Example	Example Photographs
Organic sheen	
Mussel beds	
Stranded peat	
Black lichen band	

A.5 SOS Form Examples

This section provides photographs of real oiling, with associated examples of completed forms or parts of forms.

MARINE TEMPERATE (SOS) FORM (EML ver. 26Oct16) **Incident: EXAMPLE**

1.GENERAL INFORMATION	**Date** (dd/mmm/yyyy) 03 Nov 2016	**Time** (24h standard/daylight) 10:25 – 11:15	Tide Levels (m) *During Survey* Low: 0.2 High: 1.2
Segment ID: EG-01-03	Segment Name: Example Beach		(H / M / L) (R) F /LS / HS)
Ops Zone: 1	Survey Type: SOS	STR: N/A	

Survey By: Foot P ATV S Boat __ Overlook __ Helicopter__ UAV __ Other _____ | **Weather:** Sun / Clouds / Fog / Rain / Snow Windy / Calm | **Exposure:** Exposed / Semi-Exposed / Semi-Protected / Protected / Very Protected

2. SURVEY TEAM	Name	Organization	Name	Organization
Team Number 2	Helen Dubach	OCC	Ed Standingborn	First Nations
	Sonia Laforest	Environment Canada		
	George North	BC MoE		

3. SEGMENT	Total Length: (m) 500	Length Surveyed: (m) 500	Maximum Intertidal Width: (m) 25	
Survey Start GPS: WP: 1	LAT: .	LONG: .	Entire Segment Surveyed Yes / No	Datum: WGS84
Survey End GPS: WP: 5	LAT: .	LONG: .		

4a. SHORELINE TYPE *Indicate only ONE Primary (P) (dominant) type and ALL Secondary(S) types, circle specifics as appropriate.*

BEDROCK: Cliff____ Ramp_____ Platform_____
MAN-MADE: Solid_____ Permeable_____
Description:_____
ESI Shoreline Type (primary) 3A (secondary) ___

Sediment BEACH: Sand X Mixed____ (P / C) Pebble/Cobble____ Boulder_____
Sediment FLAT: Mud____ Sand____ Mixed____ (P / C) Pebble/Cobble/Boulder____
Wetland:____ *type:*_____
Other:_____ *If snow and ice use Winter SOS*

4b. COASTAL / BACKSHORE CHARACTER *Indicate only ONE Primary (P) and ANY Secondary (S) types, circle specifics as appropriate.*

Cliff/Hill: ht.____ m. Sloped: (> (5°) 15°) (30°) | Primary Substrates: sand Forested / Vegetated: _____ | Flat / Lowland:___ Beach: ___ Dune: P Lagoon: S Wetland: ___ Man-Made: ___ | Inlet / Channel:___ Delta:___ *type:*_____

5. OPERATIONAL FEATURES: Debris: Types Large Woody Debris | Oiled: Yes / No | Amount: 2 (bags / trucks)
Direct backshore access? Yes / No | Alongshore access adjacent segment? Left / Right / Both / No | Suitable for backshore staging? Yes / No
Access Description / Restrictions: Access through dunes | Strong Currents? Yes / No

6. OILING DESCRIPTION: *Use letters A-Z. Indicate 100% overlapping oil zones in different shore zones by numbering them (e.g. A1, A2)*

Zone ID	WP # Zone Start	WP # Zone End	Substrate Type(s) or ESI Code	Shore Zone LW	Shore Zone UP	Shore Zone SU	Oil Cover: Area Length (m)	Oil Cover: Area Width (m)	Oil Cover: Distribution Dist % (> 1)	Oil Cover: Distribution Dist % (< 1)	Oil Cover: Distribution Number per unit area	Oil Cover: Size Avg Size (cm)	Oil Cover: Size Large Size (cm)	Oil Thickness TO	Oil Thickness CV	Oil Thickness CT	Oil Thickness ST	Oil Thickness FL	Oil Character FR	Oil Character MS	Oil Character TB	Oil Character PT	Oil Character TC	Oil Character SR	Oil Character AP	Oil Character NO
A1	1	5	Sand	X			500	15	90					X	X	X			X							
A2	1	5	Sand		X		500	10	30						X				X					X		
A3	1	5	Sand			X	500	-	0																	X

7. SUBSURFACE OILING CONDITIONS: *Format: Indicate Zone ID in Pit #, e.g., A-1, B-2, B-3, (use only number if not in zone e.g. 4 , 5)*

Pit #	WP #	Substrate Type Surface/Subsurface	Shore Zone LW	Shore Zone UP	Shore Zone SU	Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character AP	OP	PP	OR	OF	TR	NO	%	Water Table (cm)	Sheen Color B,R,S,N	Clean Below Yes / No
A1-1	2	s/s	X			25	-							X		25	N	Y
A1-2	3	s/s	X			30	10-15			X					30	30	R	Y
A2-1	4	s/s		X		65	12-14				X				25	60	N	Y
							-											
							-											
							-											

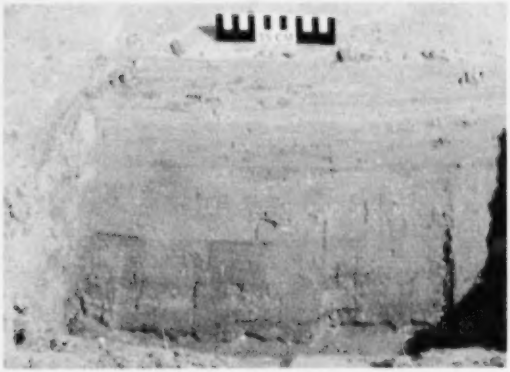
8. COMMENTS: Cleanup Recommendations; Ecological/Recreational/Cultural/Economic Issues; Wildlife Observations; Other Descriptions"

High amenity public beach
Recommend mechanical/manual removal to remove bulk oiling, then sediment relocation

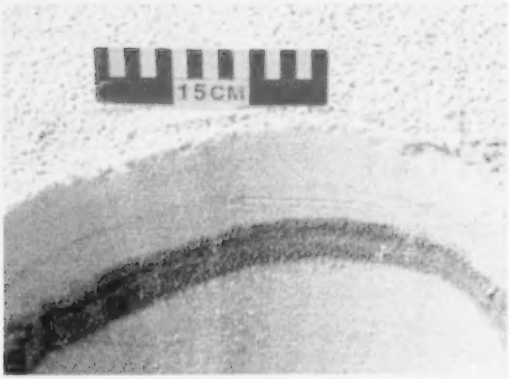
MAP: Yes / No | SKETCH: Yes / No | PHOTOS / VIDEO: Yes / No (107-135) | TRACKLINE: Yes / No | WAYPOINTS: Yes / No
Form Completed By: H. Dubach | Photographer(s): H. Dubach | GPS Person / Unit: H. Dubach

6. OILING DESCRIPTION: *Use letters A-Z, indicate 100% overlapping oil zones in different shore zones by numbering them (e.g. A1, A2)*																									
Zone ID	WP # Zone Start	WP # Zone End	Substrate Type(s) or Ecotode	Shore Zone			Oil Cover						Oil Thickness					Oil Character							
							Area		Distribution		Size														
				LW	UP	SU	Length (m)	Width (m)	Dist % in ID	Number per unit area	Avg Size (cm)	Large Size (cm)	TO	CV	CT	ST	FL	FR	MS	TB	PT	TC	SR	AP	NO
A	5	6	Sand		X		250	1.5	80					X					X						

6. OILING DESCRIPTION: *Use letters A-Z, indicate 100% overlapping oil zones in different shore zones by numbering them (e.g. A1, A2)*																									
Zone ID	WP # Zone Start	WP # Zone End	Substrate Type(s) or Ecotode	Shore Zone			Oil Cover						Oil Thickness					Oil Character							
							Area		Distribution		Size														
				LW	UP	SU	Length (m)	Width (m)	Dist % in ID	Number per unit area	Avg Size (cm)	Large Size (cm)	TO	CV	CT	ST	FL	FR	MS	TB	PT	TC	SR	AP	NO
A	5	6	Sand		X		250	1		15/m²	2	3		X						X					



7. SUBSURFACE OILING CONDITIONS: *Format: indicate Zone ID in Pit #, e.g., A-1, B-2, B-3 (use only number if not in zone e.g. 1, 5)*																			
Pit #	WP #	Substrate Type Surface/Subsurface	Shore Zone			Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character								Water Table (cm)	Sheen Color R,R,S,N	Clean Below Yes / No
			UW	LW	SU			AF	OP	PP	OR	OF	TR	NO	%			
A-4	45	s/s		X		40	0 - 10				X				15	40	N	Y



7. SUBSURFACE OILING CONDITIONS: *Format: indicate Zone ID in Pit #, e.g., A-1, B-2, B-3 (use only number if not in zone e.g. 1, 5)*																			
Pit #	WP #	Substrate Type Surface/Subsurface	Shore Zone			Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character								Water Table (cm)	Sheen Color R,R,S,N	Clean Below Yes / No
			UW	LW	SU			AF	OP	PP	OR	OF	TR	NO	%			
B-2	12	s/s			X	85	5-8			X					100	80	S	Y

B | SCAT Management Job Aid

B.1 Endpoints, STRs and SIRs

B.1a Endpoint Examples

The following table provides photographic examples of potential endpoint criteria using SCAT terminology:

Example Endpoint Criteria	Example Photographs
<10% Stain PASS	
<1% Tar balls FAIL >1% Tar balls (closer to 2-3%)	
10% Coat FAIL <10% but >0.1 cm (= COVER)	
Subsurface < 10 cm thick oil residue PASS	

B.1b Shoreline Treatment Recommendation (STR) Form

Shoreline Treatment Recommendation (STR) Form

Incident: STR #: Survey Date:

Site Location (Coordinates)

Segment: STR shoreline Length (m): STR Width (m):

Shoreline Type: Substrate(s) Coastal Character:

Box 1 - Oiled Area for Treatment (SCAT / EU)

Box 2 - Treatment Recommendations (SCAT / EU)

Box 3 - Staging and-or Logistic Recomendations / Constraints / Waste Issues (SCAT / OPS)

Box 4 - Ecological Resource Issues Comments

Box 5 - Historical / Cultural / First Nations Issues Comments

Box6 - Safety Issues Comments (SCAT / EU / OPS / Response Safety Officer)

Attached: ☐ Segment Map ☐ Sketch Map ☐ SOS Form ☐ Fact Sheet Other

STR APPROVALS Signatures (Stake Holder)

( ) ( ) ( )

( ) ( ) ( )

Prepared By: Date Prepared:

Date						
Time						
	To ( )	To ( )	To ( )	To ( )	To ( )	To ( )	To ( )

Generated from the SCAT Database

B.1c Shoreline/Segment Inspection Report (SIR) Form

Shoreline Inspection Report (SIR) _____

Incident: _____

Segment ID:_____ **Team Lead:**_____

Survey Date:_____ **Survey Time:**_____

Tide Level:_____ **Weather:**_____

Inspection Completed Along Entire Segment: Yes No

Result/Recommendation:

- ☐ No oil observed (NOO)
- ☐ Meets established NFT endpoints
- ☐ No further treatment recommended (NEB / ALARP / Safety / Access / Other)

Survey Team Members:

STAKE HOLDER (agency)	NAME (representative)	SIGNATURE

- ☐ Further treatment recommended (continue under existing STR).
- ☐ Additional treatment recommended. (Provide documentation and comments) Prepare new STR as required.

(Provide written details of observations, issues and required actions)

B.1d Post Treatment Assessment (PTA) Form

Post Treatment Assessment (PTA) Form

Segment ID:_____ **Team Lead Name :**_____

Survey Date:_____ **Survey Time:**____ : ____ **to** ____ : ____

Tide (water) Level:_____ **Weather:**_____

STR Number: _____

Inspection Completed For Entire STR Area: Yes No

Inspection Completed Along Entire Segment: Yes No

Result/Recommendation:

- ☐ Ready for SIR
- ☐ STR (Continue)
- ☐ Additional Treatment Recommended (new or modified STR required)

(Provide written details of issues, required actions and any additional treatment recommendations)

☐ Pictures attached

B.2 SCAT Management Forms

SCAT Management (planning and logistics) forms fall into three categories based on their functionality and purpose:

- **Long-range** strategy and tracking table,
- **Short-term rolling** mission plan, and
- **Daily** tasking and logistics plan.

B.2a Long-Range Strategy and Tracking Table

The long-range strategy and tracking table provides a long-range survey strategy plan for a period of a month or longer. The table allows the SCAT Manager/Coordinator and/or SCAT Logistics Coordinator to set priorities, enables planning for staffing rotations and logistics support, and tracks each mission and activity. The table also provides a full history of the SCAT program for the duration of an incident.

B.2b Short-Term Rolling Mission Plan

The short-term rolling mission plan provides a rolling 7-day (or 10-/14-day) plan for SCAT missions. The plan allows the SCAT Coordinator and/or Logistics Coordinator, with input from the EUL and Operations, to plan for several days to ensure appropriate data, logistics and safety support are made available to the SCAT field teams. The plan requires continuous updating based on survey priorities and on completed work, and is updated and reissued daily.

B.2c Daily Tasking and Logistics Plan

The daily tasking and logistics plan describes the planned SCAT field activities for the following day / Next Operational Period. The plan is prepared by the SCAT Logistics Coordinator and/or SCAT Coordinator, and provided to the EUL in time for the Tactics Work Period and Tactics Meeting during each Planning Cycle. The plan becomes part of the package of EU field assignments and activities reviewed in the Tactics Meeting to develop Work Assignments that are captured on the ICS 204 form (*Assignment List*) for the Next Operational Period. These field assignments are then included in the Incident Action Plan (IAP).

Example Management forms are provided in this section.

Long-Range Strategy and Tracking Table					
Monday, January 02, 2017	Travel Day	Travel Day	Travel Day	green = previously completed activities	
	TL Name	TL Name	TL Name		
Tuesday, January 03, 2017	Location Segment ID Mission Type Status	Duck Island DK01-014 BP Completed	North Bay NB01-012 SIR Passed		
	TL Name	TL Name	TL Name		
Wednesday, January 04, 2017	Location Segment ID Mission Type Status	Bird Island BD03-001 MON	North Bay NB01-014 SIR	Travel Day	Travel Day
	TL Name	TL Name	TL Name	TL Name	TL Name
Thursday, January 05, 2017	Location Segment ID Mission Type Status				
	TL Name				
Friday, January 06, 2017	Location Segment ID Mission Type Status				
	TL Name				
Saturday, January 07, 2017	Location Segment ID Mission Type Status				
	TL Name				
Sunday, January 08, 2017	Location Segment ID Mission Type Status				
	TL Name				
Monday, January 09, 2017	Location Segment ID Mission Type Status				
	TL Name				
Tuesday, January 10, 2017	Location Segment ID Mission Type Status				
	TL Name				

Short-Term Rolling Mission Plan

DATE	SCAT TEAM #1	SCAT TEAM #2	SCAT TEAM #3	SCAT TEAM #4
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead
DD Month YYYY	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead	**Location** *Mission(s)* Team Lead

Recommended Mission Abbreviations	
RAS	Reconnaissance (aerial or ground) Assessment Survey
SOS	Shoreline Oiling Assessment Survey
PTA	Post-Treatment Assessment Survey
SIR	Shoreline Inspection Report Survey
OLS	Operations Liaison Support
BP	Beach Profiling
PM	Photo Monitoring
MON	Monitoring

Daily Tasking and Logistics Plan

SCAT TEAM LOGISTICS for [date (DD/MM/YY)] Issued: [Date/Time]			
Team	**Staff**	**Name / Phone No.**	
SCAT Team #1	Team Lead		
	Federal		
	Province		
	Other?		
SCAT Team #2	Team Lead		
	Federal		
	Province		
	Other?		
SCAT Team #3	Team Lead		
	Federal		
	Province		
	Other?		
SCAT Team #4	Team Lead		
	Federal		
	Province		
	Other?		

	Survey Area	Mission	Logistical Arrangements	Time
	Place Name Segment number(s)			
	Place Name Segment number(s)			
	Place Name Segment number(s)			
	Place Name Segment number(s)			

B.3 SCAT Plan Outline

The SCAT Plan has been approved by the Spill Management Team and serves as a procedural standard that defines the specific SCAT methodology and process for an incident and the use of SCAT data in decision making. Typically, the Plan for a Shoreline Response Program would cover the following topics:

Introduction	– Purpose of the Document – Objectives of the Program – General Location Map
Program Phases	– Bulk Oil Removal – Treatment – Inspections and Monitoring – Completion
SCAT Procedures	– Orientation to SCAT – Survey Principles – Types of SCAT Surveys – SCAT Methodology Standards – Shoreline Classification Standards – Segmentation Procedures – Documentation, Forms and Terminology
SCAT Program Management	– Organization – SCAT Team Participation – Number of Field Teams – Training – Schedule – Training and Calibration – Logistics – Data Management – Cultural Resources Program

Shoreline Treatment	– Treatment Endpoint Criteria – Treatment Tactics – Approved and Discretional – Shoreline Treatment Recommendations (STRs)
Treatment Completion	– Post-Treatment Assessment – Shoreline/Segment Inspection Report (SIR) – Treatment Completion Process – Post-Treatment Monitoring
Appendices	– SCAT terminology – Shoreline Type and Backshore Character – SOS Forms – STR and SIR Forms – Cultural Resource and Ecological Treatment Constraints – Treatment Endpoint Criteria – Treatment Methods and Endpoints by Shoreline Type – SCAT Management and Planning Forms – Predicted Tides and Low Tide Windows – Job Aid(s) – Job Safety Analysis (JSA)

B.4 First Response and Equipment Checklists

B.4a SCAT First Response Checklist

SCAT Checklist: Initial (Reactive) Phase			
Item	**Action**	**Responsibility**	**Ref.**
1	Activate/mobilize SCAT Program Manager/Coordinator	Environmental Unit Leader	Table 3.1
2	Activate/mobilize and brief SCAT Team Leaders, SCAT Logistics Coordinator, SCAT Data Manager, data/GIS staff and SCAT Operations Liaison Leads as appropriate	SCAT Program Manager / Coordinator	Table 3.1
3	Obtain EU data and information regarding oil properties, location, transport, fate, effects, behaviour and resources at risk	SCAT Coordinator	6.1, 6.3
4	Deploy aerial reconnaissance and/or rapid ground response teams to gather initial shoreline oiling information to generate a broad picture of the size of the affected shoreline and the degree of oiling	SCAT Coordinator	6.4
5	Establish communications and coordination with relevant stakeholders within the Incident Management Team (IMT), i.e. Shoreline Response Program, EUL, Planning Section, field operations, air operations, logistics and safety personnel	SCAT Coordinator	3.3, 3.4
6	Establish communications and coordination with relevant federal, provincial and local agencies and other external stakeholders through the EUL	EUL / SCAT Coordinator	Table 3.1
7	Establish the shoreline survey objectives, strategies and phases	SCA-TS / SCAT Coordinator	2.5
8	Develop the scope and scale of the initial area to be surveyed by field teams, and survey priorities	SCA-TS / SCAT Coordinator	2.5

SCAT Checklist: Initial (Reactive) Phase			
Item	**Action**	**Responsibility**	**Ref.**
9	Determine the number of field survey teams, rotations and appropriate level of support personnel required for the duration of the program	SCAT Coordinator / Logistics Coordinator	3.5
10	Determine the need for specialists in the field teams, depending on the potential shoreline issues and/or concerns, e.g. geomorphologists, archaeologists, ecologists	SCAT Coordinator	3.5
11	Coordinate with the EUL and/or agency coordinators to decide who participates in the field surveys (that is, who is represented in the field teams), and coordinate to mobilize those representatives	SCAT Coordinator	3.5
12	Determine training needs for the field teams; ensure field team members are fully trained and calibrated for the local shoreline and oiling conditions	SCAT Coordinator / Logistics Coordinator	4.6
13	Coordinate with the Logistics Section (Ground/Vessel Support Units) and Air Operations to provide transport requirements for SCAT field team(s)	Logistics Coordinator	4.4
14	Coordinate with the Safety Officer to identify incident-specific health and safety considerations for shoreline assessment operations, and produce a SCAT Safety Plan and Job Safety Analysis (JSA), and provide any appropriate training and equipment	SCAT Coordinator / Logistics Coordinator	4.5
15	Identify and assemble logistics and survey equipment for the field teams	Logistics Coordinator	4.4

SCAT Checklist: Initial (Reactive) Phase			
Item	**Action**	**Responsibility**	**Ref.**
16	Segment the survey area and communicate segmentation to the Operations Section Chief, Planning Section Chief, Logistics Section Chief, and Documentation Unit Leader. If the area is pre-segmented, check if any revisions are necessary and make the appropriate amendments	SCAT Coordinator / Data Manager	5.2, 7.1
17	Set up computer(s), printer(s) and Internet connections. Brief Team Leads on GPS and photography protocols	Data Manager	7.1
18	Produce field maps to aid logistics (e.g. access, segments) for field teams	Data Manager	7.1
19	Establish communications (radio, cell phone, sat. phone) with the SCAT teams in the field, and implement a check-in protocol until they return to the Command Post or Base	Logistics Coordinator	4.4
20	Document initial shoreline oiling conditions and shoreline access, logistics and safety issues from aerial reconnaissance and rapid ground assessment	Team Lead(s)	6.4
21	Arrange and facilitate field team briefs and debriefs at the Command Post or Base	Logistics Coordinator	4.4.1
22	Produce maps with segments, waypoints and track lines for the team lead(s) for field reports	Data Manager	7.2
23	Establish a process for QA/QC of the incoming field information; summarize field data and communicate information as appropriate to response managers and planners; ensure that Team Leads have completed QA/QC in the field data	Data Manager	7.5, 7.6 7.8

SCAT Checklist: Initial (Reactive) Phase			
Item	**Action**	**Responsibility**	**Ref.**
24	Use reconnaissance SCAT data to recommend initial treatment priorities, taking into account heavy oil distribution and the potential for oil remobilization	SCA-TS / SCAT Coordinator	8.2
25	Create and maintain a contact list of all SCAT personnel and other key players and stakeholders	Logistics Coordinator	3.2, 3.3 3.4, 3.5
26	Develop a training (including safety) and SCAT calibration plan for field personnel	SCAT Coordinator	4.6
27	Determine the requirements for any permits and how to obtain these; coordinate this process with the EU	SCAT Coordinator	Table 3.1
28	Establish a data management system with a GIS function and, if possible, access an appropriate digitized shoreline	Data Manager	7.6
29	Based on initial information from the field teams, select and, if appropriate, modify the shoreline assessment forms and coordinate with the data manager to ensure that the database is modified to accept these changes	SCAT Coordinator / Data Manager	7.2
30	Ensure that there is a survey and reporting schedule (including a daily SCAT report prepared by each Team Lead) to introduce key survey information in time for incorporation into the planning schedule for shoreline operations	SCAT Coordinator / Data Manager	7.8
31	Use initial SCAT data to develop a SCAT / Shoreline Response Plan	SCA-TS / SCAT Coordinator	8.3

B.4b Field Equipment Checklist

- ☐ GPS
- ☐ Camera (ideally with integrated GPS)
- ☐ Shovel
- ☐ SCAT Shoreline Oiling Observation forms
- ☐ Notebook (waterproof)
- ☐ Pens/pencils
- ☐ Spare batteries
- ☐ Photo scale
- ☐ Route map
- ☐ Map(s) of segment(s) being surveyed
- ☐ Communications (e.g. cell phone, radio, satellite phone)
- ☐ Sturdy footwear (e.g. hiking boots and/or rubber boots)
- ☐ Sunglasses
- ☐ Hat
- ☐ Work gloves (for digging)
- ☐ Nitrile gloves (for handling oil)
- ☐ Foul weather gear
- ☐ Personal Flotation Device (PFD) (if working on or near water)
- ☐ Other Personal Protective Equipment (PPE)
- ☐ First-aid kit
- ☐ Water
- ☐ Food/snacks

Specifically for Shoreline/Segment Inspection (SIR) Surveys:

- ☐ Shoreline Treatment Recommendation (STR) forms for the segment(s)
- ☐ Previous inspection reports, if available
- ☐ Endpoint criteria for the segments and/or shoreline types

Specifically for Aerial Reconnaissance:

- ☐ Video camera with microphone
- ☐ Spare batteries
- ☐ Aerial maps
- ☐ Flight plan
- ☐ Internal communications with pilot
- ☐ Real-time position tracking system (GPS or moving map display)

B.5 SCAT Field Forms

B.5a Shoreline Oiling Summary Forms

Shoreline Oiling Summary (SOS) forms should be selected and modified as appropriate, according to the mission type and environment. This section provides examples of SOS forms for the following:

- Marine Temperate
- Marine Wetland
- Marine Arctic/Winter
- Lake Temperate

MARINE TEMPERATE (SOS) FORM Incident: _____ Page ___ of ___

1. GENERAL INFORMATION	Date (dd/mmm/yyyy)	Time (24h standard/daylight) _____ to _____	Tide Levels (m) during Survey Low _____ High _____
Segment ID:	Segment Name:		(H / M / L) - (R / F /LS / HS)
Ops Zone:	Survey Type:	SFR:	

Survey By: Foot __ ATV __ Boat __ Overlook __ Helicopter __ UAV __ Other _____ | **Weather:** Sun / Clouds / Fog / Rain / Snow Windy / Calm | **Exposure:** Exposed / Semi-Exposed Semi-Protected / Protected / Very Protected

2. SURVEY TEAM	Name	Organization	Name	Organization
Team Number				

3. SEGMENT	Total Length: (m)	Length Surveyed: (m)	Maximum Intertidal Width: (m)	
Survey Start GPS:	WP:	LAT: .	LONG: .	Entire Segment Surveyed Yes / No
Survey End GPS:	WP:	LAT: .	LONG: .	Datum:

4a. SHORELINE TYPE *Indicate only ONE Primary (P) (dominant) type and ALL Secondary(S) types, circle specifics as appropriate.*

BEDROCK: Cliff ___ Ramp ___ Platform ___
MAN-MADE: Solid ___ Permeable ___
Description: _____
ESI Shoreline Type (primary) ___ (secondary) ___

Sediment BEACH: Sand ___ Mixed ___ (/ /) Pebble/Cobble ___ Boulder ___
Sediment FLAT: Mud ___ Sand ___ Mixed ___ (/ /) Pebble/Cobble/Boulder ___
Wetland ___ type _____
Other: _____ *If snow and ice use Winter SOS*

4b. COASTAL / BACKSHORE CHARACTER *Indicate only ONE Primary (P) and ANY Secondary (S) types, circle specifics as appropriate.*

Cliff/Hill ___ ht. ___ m. Sloped: > (5°) (15°) (30°) | Primary Substrate: _____ Forested / Vegetated: _____ | Flat / Lowland ___ Beach: ___ Dune: ___ Inlet / Channel ___ Delta: ___ Lagoon ___ Wetland ___ Man-Made ___ type: _____

5. OPERATIONAL FEATURES | Debris: Type: _____ | Oiled: Yes / No | Amount: (bags/trucks)

Direct backshore access? Yes / No | Along-shore access adjacent segment? Left / Right / Both / No | Suitable for backshore staging? Yes / No
Access Description / Restrictions: | Strong Currents? Yes / No

6. OILING DESCRIPTION: *Use letters A-Z. Indicate 100% overlapping oil zones in different shore zones by numbering them (e.g. A1, A2)*

Zone ID	WP # Zone Start	WP # Zone End	Substrate Type(s) or ESI Code	Shore Zone LW	Shore Zone UP	Shore Zone SH	Oil Cover: Area Length (m)	Oil Cover: Area Width (m)	Oil Cover: Distribution Dist. % (> 1)	Oil Cover: Distribution Number per unit area	Oil Cover: Size Avg. Size (cm)	Oil Cover: Size Large Size (cm)	Oil Thickness TO	CV	CI	SI	EL	Oil Character TR	MS	TB	PT	TC	SR	AP	RO

7. SUBSURFACE OILING CONDITIONS: *Format: Indicate Zone ID in Pit #, e.g., A-1, B-2, B-3, (use only number if not in zone e.g. 4, 5)*

Pit #	WP #	Substrate Type: Surface/Subsurface	Shore Zone LW	Shore Zone UP	Shore Zone SH	Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character AP	OP	PP	OR	OF	TR	NO	%	Water Table (cm)	Sheen Color B,R,S,N	Clean Below Yes / No
		/					-											
		/					-											
		/					-											
		/					-											
		/					-											
		/					-											

8. COMMENTS: Cleanup Recommendations; Ecological/Recreational/Cultural/Economic Issues; Wildlife Observations; Other Descriptions*

*Use supplemental marine SOS form for additional oiling zones, pits, and comments/sketches.

MAP: Yes / No | SKETCH: Yes / No | PHOTOS / VIDEO: Yes / No (-) | TRACKLINE: Yes / No | WAYPOINTS: Yes / No
Form Completed By: _____ | Photographer(s): _____ | GPS Person / Unit: _____

MARINE WETLAND OILING SUMMARY FORM **INCIDENT:** _____ Page ___ of ___

1. GENERAL INFORMATION	Date (dd/mmm/yyyy)	Time (24h standard/daylight) to	Tide Height (m) Low ____ High ____
Segment ID:	Segment Name:		
Ogn Zone:	Survey Type:	SIR:	(H / M / L) - (R / F / SS / MS)

Survey By: Foot ___ ATV ___ Boat ___ Overhead ___ Helicopter ___ UAV ___ Other ___ | **Weather:** Sun / Clouds / Fog / Rain / Snow Windy / Calm | **Exposure:** Exposed / Semi-Exposed Semi-Protected / Protected / Very Protected

Survey Team	Name	Organization	Name	Organization
Team Number				

2. SEGMENT	Total Length (m)	Length Surveyed (m)	Maximum Intertidal Width (m)	
Survey Start GPS: WP	Latitude	Longitude	Entire Segment Surveyed Yes / No	Datum
Survey End GPS: WP	Latitude	Longitude		

4a. WETLAND CHARACTER circle appropriate

Physical Setting: *Fringing Marsh / Tidal Channel / Marsh interior / Mud Flat / Lagoon* Other ___

Wetland Type: *Salt Marsh / Brackish Marsh / Mangrove* Other ___

Dominant Vegetation Type: *Reeds / Grasses / Mangrove* Other ___

4b. BACKSHORE CHARACTER *indicate only ONE Primary (P) and ANY Secondary (S)*

Unconsolidated Bluff/Bank ___ Flat/Lowland ___ Beach ___ Tidal Channel ___ Delta ___ Wetland ___ type ___

Man Made ___ type ___ Other ___

5. OPERATIONAL FEATURES	Oiled Debris? Yes / No	Type:	Amount: (bags/trucks)

Direct backshore access? Yes / No | Alongshore access from adjacent segment? Left / Right / Both | Suitable for backshore staging? Yes / No

Surface bearing capacity suitable for: Personnel / Marsh Vehicles / Other ___

Access description / restrictions: ___

6. SURFACE OILING CONDITIONS: *Identify oil on vegetation vs. substrate by adding a V (for Vegetation) or an S (for sediment) after the Zone ID (e.g. AV, AV, BV). Indicate 100% overlapping zones in different shore zones by numbering them (e.g. AV1, AV2).*

Zone ID	WP zone Start	WP zone End	Indicate Type of Oil Cover	Shore Zone			Oil Cover: Area		Oil Cover: Distribution		Oil Cover: Size		Oil Thickness					Oil Character								Length of Oil on Shoreline (km)
				SW	LIT	HIG	Length (m)	Width (m)	Dist % (>1)	Number present area	Avg Size (cm)	Large Size (cm)	PO	CV	CL	SI	FL	OB	MN	OR	PE	IG	SR	AP	Bio	

7. SUBSURFACE OILING CONDITIONS: *Use comments section, indicate on the cross section below, and/or use supplemental wetland SCS form*

8. COMMENTS: *Cleanup Recommendations, Ecological/Recreational/Cultural Issues, Wildlife Observations, Oiling Descriptions*

Use supplemental marine wetland SCS form for additional oiling areas, pits, and comments/descriptions.

MAP: Yes / No | SKETCH: Yes / No | PHOTOS / VIDEO: Yes / No ( ) | TRACKLINE: Yes / No | WAYPOINTS: Yes / No

Form Completed By: | Photographer(s): | GPS Person / Unit:

CROSS-SECTION SKETCH

Show: high tide, low tide, horizon, zone ID, other significant features

MARINE ARCTIC (SOS) FORM Incident: _____ Page ___ of ___

1. GENERAL INFORMATION

Date (dd/mmm/yyyy) | Time (24h standard/daylight) _____ to _____ | Tide Levels (m) during Survey: Low _____ High _____ (H / M / L) - (R / F / LS / HS)

Segment ID | Segment Name | Ops Zone | Survey Type | STR

Survey By: Foot ___ ATV ___ Boat ___ Overlook ___ Helicopter ___ UAV ___ Other

Weather: Sun / Clouds / Fog / Rain / Snow / Windy / Calm | Temperature: ___ C / F

Season: Open Water / Freeze-Up Transition / Frozen Period / Breakup-Thaw

Exposure: Exposed / Semi-Exposed / Semi-Protected / Protected / Very Protected

2. SURVEY TEAM

Team Number	Name	Organization	Name	Organization

3. SEGMENT

Total Length (m) | Length Surveyed (m) | Maximum Intertidal Width (m)

Survey Start GPS:	WP:	LAT: .	LONG: .	Entire Segment Surveyed Yes / No	Datum:
Survey End GPS:	WP:	LAT: .	LONG: .		

4a. SHORELINE TYPE *Indicate only ONE Primary(dominant) type and ALL Secondary types.*

BEDROCK: Cliff ___ Ramp ___ Platform ___
MAN-MADE: Solid ___ Permeable ___
Description: ___
ESI Shoreline Type (primary) ___ (secondary) ___

Sediment BEACH: Sand ___ Mixed (I / C) ___ Pebble/Cobble ___ Boulder ___
Sediment FLAT: Mud ___ Sand ___ Mixed (I / C) ___ Pebble/Cobble/Boulder ___
Boulder Barricade ___ Peat Shoreline ___ Inundated Low-lying Tundra ___
Tundra (Cliffs / Slumps) ___ Other ___

4b. SNOW AND ICE CONDITIONS *Circle all shore zone locations as necessary – Lower : Upper : Supratidal*

Snow: Cover (%) Thickness (cm) Fresh: Y / N Compacted: Y / N Location: LW UP SU

Glacier Ice: Height of ice front: (m) Floating Front: Y / N

Shoreline Ice Type:	Width (m)	Thickness (cm)	Location	Other Descriptions
			N/A	
Frozen Spray				
Ice Foot			LW UP SU	
Ice Push Ridge			LW UP SU	
Frozen Swash			LW UP SU	
Grounded Floes			LW UP SU	

4c. NEARSHORE ICE CONDITIONS *Circle one in each of the three categories*

CONCENTRATION: 0 / 10	FORM: (m)		AGE and Thickness (cm)	
	Name		New: frazil grease slush	
Open Drift: < 1/10			Nilas or ice rind	< 10
Very Open Drift: 1/10 – 3/10	Pancake 0.3 – 3	Small Floes: 20–100	Young: grey-white	10–30
Open Drift: 4/10 – 6/10	Brash < 2	Medium Floes: 100–500	First Year	> 30
Close Pack: 7/10 – 8/10	Ice Cakes < 20	Big Floe: 500 – 2000	Second Year	> 250
Very Close Pack: 9/10		Vast Giant Floe > 2000	Multi Year	>300 Age Unknown
Compact Ice: 10/10	Lost Ice: Y / N	Total Cover: Y / N		

4d. COASTAL/BACKSHORE CHARACTER *Indicate only ONE Primary (P) and ANY Secondary (S) types.*

Cliff/Hill: ___ ht. ___ m. Flat/Lowland ___ Beach ___ Dune ___ Inlet/Channel ___ Delta ___ Lagoon ___ Marsh/Wetland ___
Sloped: > (5°) (15°) (30°) Tundra / Forested / Vegetated ___ Primary Substrate: ___ Man-Made: ___ Type: ___

5. OPERATIONAL FEATURES

Debris: Types | Oiled: Yes / No | Amount: (bags/trucks)

Direct backshore access? Yes / No | Alongshore access adjacent segment? Left / Right / Both / No | Suitable for backshore staging? Yes / No

Access Description / Restrictions: | Strong Currents? Yes / No

6. OILING DESCRIPTION: *Use letters A–Z. Indicate 100% overlapping oil zones in different shore zones by numbering them (e.g. A1, A2)*

Zone ID	WP Zone Start	WP Zone End	Substrate Type(s) or ESI Code	Shore Zone LW	Shore Zone UP	Shore Zone SU	Oil Cover: Area Length (m)	Oil Cover: Area Width (m)	Oil Cover: Distribution Dist % (>1)	Oil Cover: Distribution Number per unit zone	Oil Cover: Size Avg Size (cm)	Oil Cover: Size Large Size (cm)	Oil Thickness TO	CV	CI	SI	FI	Oil Character TR	MS	TB	PI	IC	SR	AP	NO

7. SUBSURFACE OILING CONDITIONS: *Use supplemental Arctic Marine SOS form for pits and trenches*

8. COMMENTS: *Use supplemental Arctic Marine SOS form for comments/sketches.*

MAP: Yes / No | SKETCH: Yes / No | PHOTOS / VIDEO: Yes / No (-) | TRACKLINE: Yes / No | WAYPOINTS: Yes / No

Form Completed By: | Photographer(s): | GPS Person / Unit:

LAKE TEMPERATE (SOS) Form Incident: _____ Page ____ of ____

1. GENERAL INFORMATION	Date (dd/mmm/yyyy)	Time (24h standard/daylight) ____ to ____	Water Level
Segment ID:	Segment Name:		Low / Mean / High / Flood
Ops Zone:	Survey Type:	STR:	Falling / Steady / Rising

Survey By: Foot __ ATV __ Boat __ Overlook __ Helicopter __ UAV __ Other _____	Weather: Sun / Clouds / Fog / Rain / Snow Windy / Calm	Exposure: Exposed / Semi-Exposed Semi-Protected / Protected / Very Protected

2. SURVEY TEAM	Name	Organization	Name	Organization
Team Number				

3. SEGMENT	Total Length: (m)	Length Surveyed: (m)	Maximum Shoreline Width: (m)		
Survey Start GPS:	WP:	LAT: -	LONG: -	Entire Segment Surveyed Yes / No	Datum:
Survey End GPS:	WP:	LAT: -	LONG: -		

4a. SHORELINE TYPE *Indicate only ONE Primary(dominant) type and ALL Secondary types. CIRCLE those OILED*

BEDROCK: Cliff ____ Ramp ____ Shelf ____
Sediment Bluff/Cliff: ____
MAN-MADE: Solid ____ Permeable ____
Description: ____
ESI code (primary) ____ (secondary) ____

Sediment BEACH: Sand ____ Mixed ____ Pebble/Cobble ____ Boulder ____ Peat/Organics ____
Sediment FLAT: Mud ____ Sand ____ Mixed ____ Pebble/Cobble/Boulder ____
WETLAND: Swamp ____ Bog/Fen ____ Reeds ____ Marsh ____ Type ____
Wooded Upland ____ Vegetated Bank ____ Type: ____
OTHER: ____ *If snow and ice use Winter SOS*

4b. BACKSHORE CHARACTER *Indicate only ONE Primary (P) and ANY Secondary (S) types.*

Cliff/Hill ____ ht. ____ m. Flat/Lowland ____ Beach ____ Dune ____ Inlet/Channel ____ Delta ____ Lagoon ____ Marsh/Wetland ____
Sloped: > (5°) (15°) (30°) Man-Made: ____ Other: ____ Wooded / Vegetated ?

5. OPERATIONAL FEATURES	Debris: Types:	Oiled: Yes / No	Amount: (bags/trucks)
Direct backshore access? Yes / No	Alongshore access adjacent segment? Left / Right / Both / No	Suitable for backshore staging? Yes / No	
Access Description / Restrictions:		Strong Currents? Yes / No	

6. OILING DESCRIPTION: *Use letters A-Z, Indicate 100% overlapping oil zones in different swash zones by numbering them (e.g. A1, A2)*

Zone ID	WP Zone Start	WP Zone End	Substrate Type(s) or ESI Code	Swash Zone			Oil Cover						Oil Thickness					Oil Character							
							Area		Distribution		Size														
				LSZ	USZ	SSZ	Length (m)	Width (m)	Dist. % (>1)	or Number per unit area	Avg Size (cm)	Large Size (cm)	TO	CV	CT	ST	FL	FR	MS	TR	PE	TC	SR	AP	NO

7. SUBSURFACE OILING CONDITIONS: *Format: Indicate Zone ID in Pit #, e.g., A-1, B-2, B-3, (use only number if not in zone e.g. 4, 5)*

Pit #	WP #	Substrate Type Surface/Subsurface	Swash Zone			Pit Depth (cm)	Oiled Interval (cm-cm)	Subsurface Oil Character								Water Table (cm)	Sheen Color B,R,S,N	Clean Below Yes / No
			LSZ	USZ	SSZ			AP	OP	PP	OR	OF	TR	NO	%			
		/																
		/																
		/																
		/																
		/																
		/																

8. COMMENTS: Cleanup Recommendations; Ecological/Recreational/Cultural/Economic Issues; Wildlife Observations; Other Descriptions

MAP: Yes / No | SKETCH: Yes / No | PHOTOS / VIDEO: Yes / No ( ) | TRACKLINE: Yes / No | WAYPOINTS: Yes / No
Form Completed By: | Photographer(s): | GPS Person / Unit:

B.5b Pre-SCAT Data Form

3 GENERAL INFORMATION *(Please use full date e.g. 21-AUG-2016 , 24 hour time e.g. 14:30 and decimal degrees – WGS84)*	
Segment ID: Location:	Survey Method: Foot / ATV / Boat / Air / Other:
Survey Date: – – Survey Time: : to :	Segment Length: Max Width: (m)
Team ( ) *Participants:*	Tide Level: - (m) (H / M / L) (R – F)
	Exposure: E / SE / SP / P / VP Max Fetch: (km)
GPS: Start (WP) Lat: Long: End (WP) Lat: Long:	

3 PHYSICAL CHARACTER										
		PRIMARY			SECONDARY		TERTIARY		Subsurface	
		Material	Form		Material	Form	Material	Form	(cm)	Material
Backshore	Inland			Height (m): Slope:						
	Fringe			Height (m): Slope: Width (m)						
Shoreline	Supra (SU)			Height (m): Slope: Width (m):						
	Upper (MI-UI)			Slope: Width (m):						
	Lower (LI-MI)			Slope: Width (m):						
	ESI CODE- Primary:		Secondary:		BC Coastal Class:					

3 TIDAL INLETS, RIVERS, STREAMS, BARRIERS, AND LAGOONS *(within Segment – circle as appropriate)*					
Inlet: WP:	Open (stable)	Open (migrating)	Variably open/closed	Streams-Rivers: WP's:	Continuous Seasonal Ephemeral
Channels:	Single / Multiple			Single / Multiple	
Character:	Simple / Overlapping			Straight / Meander / Braided / Anastomosed	
Width (metres):	< 10 / 10-50 / 50-100 / 100 – 1000 / >1000 Estimate: m.			< 5 / 5 – 10 / 10-50 / 50-100 / > 100 / Est. m Natural / Confined / Drainage / Controlled / Culvert	
Barrier Category:	Stable / Vegetated / Overwashed / Breached			Lagoon Category:	Open / Closed

3 POTENTIAL OIL BEHAVIOUR *(circle and describe as appropriate)* *(A=Abundant, M=Moderate, S=Sparse)*	
Natural Bay or Embayment: Y / N	Wetlands – Mud Flat: Y / N Type:
Ice onshore during winter months: Y / N	Fresh Water Outlet in Segment: Y / N Type:
Overwash Evident / Possible: Y / N	Natural Alongshore Barrier: Y / N Type:
Natural Collection Site: Y / N	Man-Made Alongshore Barrier: Y / N Type:
Debris in Segment: A - M - S Type:	Burial Potential (Low / Moderate / High)
LWD (Log) Accumulation A - M - S Supra / Upper / Lower	Penetration Potential (Low / Moderate / High)
Kelp: A-M-S / Fucus: A-M-S / Ulva: A-M-S / Eelgrass: A-M-S	Remobilization Potential (Low / Moderate / High)

3 RESOURCE ISSUES:	*Observed / Known Resource(s) at Risk*	*Response Constraints*
Environmental		
Cultural / Subsistence		
Human Use/Economic		

3 VISUALS and SURVEY DATA	Persons/device: (
MAP: Yes / No | SKETCH: Yes / No PHOTOS/VIDEO: Yes / No (-) | TRACKLINE: Yes / No | WAYPOINTS: Yes / No	

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3 PROPERTY REFERENCE INFORMATION *(circle)*	Name:
Property Jurisdiction (if known): Federal / Provincial / Municipal / Private / Corporate / First Nations	
Property Type: Natural / Agricultural / Commercial / Industrial / Residential / Recreational / Managed Area (Park)	
Property Owner:	Contact #:

3 ACCESS and LOGISTIC CONSTRAINTS *(circle as appropriate)*	
Remote Area: Y / N	Strong Currents: Y / N
Exposed Coast: Y / N	Large Tidal Range (>2m): Y / N
Backshore Cliff or Manmade impediment: Y / N	Alongshore Access within segment: Y / N (Tidal Constraints)
Narrow intertidal zone: Y / N	Alongshore Access to adjacent segment: (Tidal Constraints)
Access constraints: (circle below) Y / N	*Looking onshore* - Left / Right / Both / No
shoals / reefs / bars / kelp / wetlands / tidal flats / platforms	
Other Access Constraints / Considerations:	

LAND ACCESS YES / NO *(circle)* *If access is available on this segment, circle as appropriate*	
To Backshore (staging area)	Type: Foot Path / Unimproved Track / Unimproved Road / Improved Road / Other:
	Equipment: Foot Crew / ATV / 4WD-Trucks / Light Equipment / Heavy Equipment / Other:
WPT:	Location: Direct / Alongshore (from Adjacent Segment) | Public / Private | Street:
To Shore Zone (Intertidal)	Type: Foot Path / Unimproved Track / Unimproved Road / Improved Road / Other:
	Equipment: Foot Crew / ATV / 4WD-Trucks / Light Equipment / Heavy Equipment / Other:
WPT:	Location: Direct / Alongshore (from Adjacent Segment) | Public / Private

WATER ACCESS YES / NO *(circle)* *If shoreline access is available on this segment, circle as appropriate*	
Shore Zone (Intertidal)	Airboat / Skiff-Inflatable / Hovercraft / Shallow Draft (Work Boat - Landing Barge)
	Moderate Draft (Crew Boat – large landing Craft) / Deep Draft / Other:

Infrastructure *(Circle)*: Boat Ramp: WP____ / Dock or Wharf: WP____ / Intertidal Facility: WP____ :

AIR ACCESS (Helicopter) YES / NO *(circle)* *If safe Helicopter access is available on this segment, circle as appropriate*		
RESTRICTED:	SHORT-TERM:	SHUT DOWN:
Hot drop/pickup possible if required	Safe landing areas with tidal constraints	Long term staging area

3 STAGING YES / NO *(circle)* *If staging is available on this segment or nearby, circle as appropriate*	
Shoreline Staging Access	Low Bank-Berm / Path-Trail / Road / Ramp / Dock / Other:
Staging on this Segment	Large Paved / Large Unimproved / Small Paved / Small Unimproved / Limited (Bags) / Other:
Staging Nearby Segment Number:	Large Paved / Large Unimproved / Small Paved / Small Unimproved / Limited (Bags) / Other:
	Location: (Distance: (km) | Access Type:
Dry land storage facility available: YES / NO Describe:	
Describe the amount of pre-impact debris pickup/relocation work? (light / moderate / heavy) (____ Bags / ___ Trucks)	

Large = (> 50 x 50 meters) Small = (< 50 x 50 meters) Unimproved = (grass, sand, gravel with reasonable bearing capacity)

3 SAFETY CONSIDERATIONS *Note specific safety concerns, issues and constraints for access and operations.*

3 ADDITIONAL COMMENTS	Weather Conditions: Sun – Overcast – Rain – Snow – Fog / Windy – Calm

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Appendix 2 – GPS Guidelines

GPS Devices

Global positioning systems (GPS) or global navigation satellite systems (GNASS) use a series of Earth orbiting satellites to determine the location of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities (three position coordinates and clock deviation from satellite time). Where the line of site to orbiting satellites is obscured, e.g. dense vegetation, mountains, valleys, rock cliffs or buildings, in vehicles, backpacks or pockets, etc., accuracy can be further reduced or completely impede positioning. Modern GPS receivers may provide access to multiple networks such as Navstar, GLOSNASS and Galileo. Although incorporating additional navigation networks does not generally improve accuracy, having access to more satellites may improve positioning in challenging terrain.

Field SCAT surveys and operations support should understand the limitations of GPS equipment in positioning and relocating features on shorelines. The accuracy of traditional hand-held GPS receivers is generally consistent and repeatable within 10–15 metres. Most modern receivers also incorporate Satellite Based Augmentation Systems (SBAS). The primary system in North America is the Wide Area Augmentation System (WAAS). WAAS satellites are located in a geosynchronous equatorial orbit requiring a clear view of the southern sky. When enabled, WAAS uses two of the satellite channels on the receiver, and can often improve positioning accuracy to three metres or less. Other devices, such as phones and tablets, may use local cell tower and Internet site (WLAN) trilateralization to improve accuracy.

Most GPS receivers available today indicate an "accuracy" value determined by an evaluation of the satellite data and available correction information. This is an "estimated" value typically based on a 50% circular error probable (CEP), which means that 50% of all measurements are within the indicated value and 50% are outside the indicated value. Doubling this value increases the "accuracy" to approximately 95%, which may be a more realistic estimate. If more accurate positioning is required, there are commercially available GPS mapping and survey options that can reduce positioning to less than one metre.

Time and Date Calibration

The different settings and features of the equipment used during a survey must be understood in order to ensure consistency across a field program.

- Dates and times on GPS devices, cameras and watches should be set to the same, correct time and time zone at the start of a survey (Figure A2.1). This is critical for georeferencing cameras that do not have a built-in GPS.
- Times written on forms and notes must match the waypoint and photo information recorded on the device.
- If more than one GPS is used during the survey, the team should choose a "designated GPS" for the recorded survey information, including survey waypoints.
- It is good practice to conduct a cross-device calibration to compare the different units. This can be achieved by placing each GPS and/or GPS-enabled camera at the same location for a minute and recording the coordinates. This information can be used to compare the distance offset between the devices and to adjust measurements, if required, or to indicate that a device may be malfunctioning or providing unreliable coordinate information.
- Another useful calibration technique is to take daily waypoints at a known location that can be plotted or seen on satellite imagery or Web-based mapping systems, such as Google Earth (for example, a corner of a building). Plotting these waypoints can provide reference and offset correction data for mapping.
- Ideally, all cameras used in the field would be equipped with a built-in GPS and electronic compass to expedite post-survey processing.
- If built-in GPS devices are not available, a photo of the GPS showing the current time (hh:mm:ss) must be taken at the start of each survey.
  - This photograph is necessary to provide an offset time between the photo time data and the GPS track-line time data for georeferencing photos during post-survey processing.
  - It is important in this situation that the GPS used for the camera processing is carried by, or near to, the person taking the photos.
- It is a good survey practice to always take a pre-survey photo of the GPS, even if using GPS-enabled equipment, as a safety backup and crosscheck. GPS coordinates recorded by cameras generally should not be used for positioning features or potential oil targets as often these do not have the same accuracy as dedicated GPS devices, which may have access to additional positioning services.

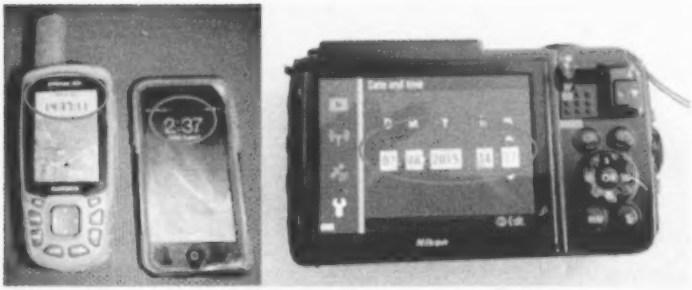

Figure A2.1 *Time and date calibration*

Track Recording

- GPS units should be set to record track coordinates on a **time interval** (not "Distance" or "Automatic"), in order to record regular coordinate fixed intervals that can be used to link track-line data in post-survey applications with other datasets, such as the location of photographs.
- The GPS units should be set to an appropriate time interval for the survey method and duration.
  - A 1–2 second interval should be used for aerial overflights.
  - A 5–10 second interval is considered reasonable for a walking survey.
  - A 3–5 second interval would be recommended for canine GPS units in order to more accurately record abrupt changes in direction and speed that are typical of canine movements.
  - The selected time interval depends in part on the memory capacity of the individual GPS device and the expected duration of the survey. For example, most Garmin field GPS units can store 10,000 fixes in "active or current" memory (10,000 / 5 seconds = 13+ hours) (Table A2.1).
- The active or current GPS track line should be set NOT to overwrite when full, unless the device is capable and set to automatically move the track line data to secondary memory when the "current" track is full before overwriting.
- GPS units have an option to "Save" track lines. Care should be taken with this option as some GPS devices average the track data to reduce file storage size and, in so doing, only save a portion of the recorded information required for photo linking.

- Some GPS units have an "archive" feature that allows saving of multiple track lines to secondary memory that can be downloaded from the unit. This type of GPS unit can typically be set to "archive" on a daily basis, or when the "current" track memory is full.
- The current day's track line should be downloaded and provided to the SCAT data management team at the end of each day of surveys.
- The "active or current" track line should be cleared before the next day's surveys are started.

Table A2.1 *Available GPS Memory*

Time Interval (s)	Hours of Recording
1	2.7
2	5.5
3	8.3
4	11.1
5	13.9
10	27.8
30	83.3

Waypoints

- Typical field GPS units have a waypoint capacity of 500 to 2000.
- Waypoint capacity should be monitored, and older survey waypoints cleared as necessary.
- It is often useful to save important waypoints/coordinates, such as segment boundaries, in the GPS unit for future surveys.
- If waypoints are kept for reference it is useful to rename them to avoid any confusion.
- Each waypoint is recorded with a date and time so the data management team can associate waypoint numbers with survey form dates and times.
- Where more than one GPS unit is used for a survey, the GPS (or GPS files) provided to data management for the survey should be the GPS (or files) used to record waypoints on the forms for the survey.

For additional information:

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